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REGULATION OF GROUNDWATER CONTAMINATION IN CANADA

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I. INTRODUCTION

Approximately 6.2 million Canadians, or twenty-six percent of the population, rely on groundwater for domestic purposes.¹ In Ontario, approximately twenty-three percent of the population,² or about two million people, use groundwater either through wells or through municipal systems.

Sources of groundwater contamination are often categorized into point sources and non-point sources. Point sources include municipal and industrial waste disposal sites, underground storage tanks, mine tailings, deep well disposals and spills. Non-point sources include fertilizers and pesticides, acid rain and road salt.³

This paper will deal with the regulation of groundwater contamination primarily in Ontario. A broad definition will be given to the word "regulation," to include all statutes, regulations and guidelines which affect groundwater quality.

First, the common-law actions for seeking private redress in cases of groundwater contamination will be reviewed and current Canadian case law examined. These actions cover nuisance law, the rule in *Rylands v. Fletcher*⁴ and the concept of negligence. The paper will then describe in detail both the federal and Ontario legislation and guidelines affecting groundwater quality.

Second, Ontario's regulation of groundwater quality will be examined under three categories. The general prohibitions against ground-

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1. Hess, *Ground Water Use in Canada, 1981*, NHRI Paper No. 28, IND Technical Bulletin No. 140 at vii (Ottawa: National Hydrology Research Institute, Environment Canada, 1986).

2. C. Pupp & G. Grove, *Groundwater Quality in Ontario: Hydrogeology, Quality Concerns, Management* 4 (Apr. 28, 1989) (unpublished).

3. ONTARIO MINISTRY OF THE ENV'T, *WATER MANAGEMENT: GOALS, POLICIES, OBJECTIVES AND IMPLEMENTATION PROCEDURES OF THE MINISTRY OF THE ENVIRONMENT* 27-28 (1984).

4. 3 L.R.-E. & I. App. 330 (H.L. 1868).

water pollution will be first considered, then specific pieces of legislation and how they regulate specific sources of groundwater contamination and, finally, the guidelines and policies which affect groundwater quality. Our evaluation of the effectiveness of the regulatory scheme will be found throughout the paper.

II. THE COMMON LAW

A. Description

Groundwater was described at common law as "water percolating through underground strata, which has no certain course and no defined limit, but oozes through the soil in every direction in which the rain penetrates."⁵

The owner of the land under which such water was percolating has neither a right of ownership over the water nor a right to support from it.⁶ In fact, a neighbor could draw off as much underground water as he or she pleased and thereby even dry up his or her neighbor's well without any cause of action arising.⁷ This absolute right to appropriate groundwater was upheld even in cases where the groundwater was taken for a malicious purpose.⁸ This result is distinguishable from the general law of riparian rights which gives the riparian owner rights to the reasonable enjoyment of the stream and the right to take water from the stream for extraordinary purposes so long as the purpose is reasonable and connected with the riparian tenement.⁹

Whereas no action lay at common law for the diversion of underground water which percolated below the surface, a cause of action in private nuisance did arise against anyone who polluted such percolating water. A private nuisance is the unreasonable interference with the use and enjoyment of land.¹⁰ In *Ballard v. Tomlinson*,¹¹ the defendant constructed a printing house and a drain. Sewage from the printing house found its way first into the defendant's well and then into the plaintiff's well through the percolating water which connected the two wells. The court, in giving judgment for the plaintiff, held that "as soon as the de-

5. *Chasemore v. Richards*, 1843-60 All E.R. 77, 81-82 (H.L. 1859).

6. This common-law right to abstract or interfere with the flow of underground water, whatever the effect on the owner's neighbor, is not a defense in respect of any pumping exceeding the quantity authorized under the Ontario Water Resources Act. See *National Capital Comm'n v. Pugliese*, [1979] 2 S.C.R. 104.

7. *Acton v. Blundell*, 152 Eng. Rep. 1223 (Ex. Ch. 1843).

8. *Mayor of Bradford v. Pickles*, 1895 App. Cas. 587.

9. 49 HALSBURY'S LAWS OF ENGLAND para. 403 (4th ed. 1984).

10. A. LINDEN, *CANADIAN TORT LAW* 514 (4th ed. 1988).

11. 29 Ch. D. 115 (1885).

fendant interferes with the beneficial use by the plaintiff of that right, incident to the ownership of the land, in my opinion, he has a right of action."¹² The defendant in this case argued that as he could have pumped out all of the water so as to leave the plaintiff's well dry, the plaintiff should have no cause of action. The court distinguished previous cases involving the diversion of groundwater by stating that in those cases the defendants were exercising a natural right in extracting water, whereas in this case they were "simply putting filth on their own land in such a way that it gets into the underground water in the water-bearing strata."¹³

The Canadian courts have followed the decision in *Ballard v. Tomlinson*. In *Jackson v. Drury Construction Co.*¹⁴ the defendant's blasting operations opened up fissures in the granite bedrock which allowed materials from a neighboring piggery to enter the plaintiff's well. The court found for the plaintiff on the grounds of private nuisance after noting that the annoyance was substantial and unreasonable and holding that "the plaintiff ought not to have been deprived of [the] beneficial purposes"¹⁵ of the groundwater.

Nuisance law was also relied on *Lohnes v. Corkum*,¹⁶ in which the plaintiff's well became contaminated as a result of the defendant's use of heavy machinery near a brook. The court followed *Jackson* and found that the defendant was liable in nuisance even if he was not negligent. Other cases in which the law of private nuisance has been applied to the pollution of groundwater have included the pollution of a well from an underground storage tank¹⁷ and groundwater pollution from salt water resulting from the construction of a floodway.¹⁸

Another cause of action which could be used to regulate groundwater contamination is public nuisance. A public nuisance is simply a wrong against the public at large and must materially affect the reasonable comfort and convenience of a class of Her Majesty's subjects.¹⁹ Public nuisance actions are less common than private nuisance actions because of the standing requirements: only the Attorney General, or someone acting with his consent, may commence a public nuisance ac-

12. *Id.* at 124.

13. *Id.* at 123.

14. [1975] 4 O.R.2d 735 (1974).

15. *Id.* at 740.

16. 121 D.L.R.3d 761 (1981).

17. *Bennett v. Imperial Oil Ltd.*, 28 D.L.R.2d 55 (Nfld. 1961).

18. *Connery v. Government of Manitoba*, 15 D.L.R.3d 303 (Man. R. 1971).

19. A. LINDEN, *supra* note 10, at 495.

tion. Given the panoply of statutory schemes for environmental control, public nuisance actions have become virtually extinct in Canada.

The principle in *Rylands v. Fletcher*²⁰ affords another possibility for framing an action for groundwater pollution. The case involved an action by a mine owner for damage done to his mines as a result of the escape of water from the defendant's reservoir. The court found for the plaintiff despite a previous finding by the lower court that the defendant was not negligent. The principle of the case is stated in the headnote as follows:

If a person brings or accumulates on his land anything — e.g., water, or filth, or noxious fumes — which if it should escape, may cause damage to his neighbor, he does so at his peril. If it does escape and cause damage, he is responsible, however careful he may have been, and whatever precautions he may have taken to prevent the damage.²¹

In *Duncan v. The Queen*²² the rupture of a Department of National Defense sewer main had been discharging sewage into the groundwater for three years before it was discovered. The defendant argued that the carrying of sewage in a sewer main was outside the scope of *Rylands v. Fletcher*. The court disagreed and found that the bringing of sewage onto land was dangerous and "not such a 'natural' use of the land so as to take the facts outside of the doctrine."²³ The court concluded that the Department of National Defense was under a legal duty and therefore liable under the rule in *Rylands v. Fletcher*.

The final common-law ground for seeking redress for groundwater pollution is in negligence. Negligence was found to be an alternative source of liability in *Duncan v. The Queen* but is less common than a nuisance action as a nuisance action effectively places the burden on the defendant to show why he or she is not liable.²⁴

While there are sound bases for bringing private actions for damage due to groundwater contamination, there is still a great public interest in preventing such pollution. It is this public interest which has resulted in both federal and provincial legislation regulating groundwater quality.

B. Evaluation

The common law is not a very effective technique for ensuring groundwater quality. An action in private nuisance between neighbors is

20. 3 L.R.-E. & I. App. 330 (H.L. 1868).

21. *Id.* at 330.

22. 1966 Ex. C.R. 1080.

23. *Id.* at 1105.

24. D. PERCY, THE REGULATION OF GROUND WATER IN ALBERTA 32 (1987).

always possible, of course, but will tend to affect relatively few individuals. Moreover, it is not in every case that problems of proof and causation will be simply and inexpensively resolved. For that reason, such actions tend to be rare.

Actions for public nuisance tend to be rarer still. The law of standing requires that public nuisances be litigated only by the Attorney General as a representative of the public, or by an ordinary member of the public with the consent of the Attorney General. Public nuisance cases in Canada, where such consent has been granted, are virtually unknown and as such "the action has limited potential as a means of vindicating the interests of environmentalists."²⁵ Moreover, as class actions for damages are effectively impossible under Canadian law at the present time²⁶ (with the limited exception of Quebec),²⁷ the environmental class action is also unknown. As well, since much of the activity which takes place with point sources of contamination is now licensed by the provincial Ministry of the Environment, this statutory authority can serve as a defense to a nuisance action.²⁸ In addition, the cost and delays involved in civil litigation suits provide general disincentives for commencing nuisance and negligence actions. In all, then, the common law has very limited and very local application to the regulation of groundwater quality.

III. THE REGULATORY SCHEME

A. Federal Regulation

1. Description

Federal statutes and regulations governing groundwater are few in number because the federal government's jurisdiction is limited to groundwater as it affects railways, Arctic waters, Indian lands, national parks and programs with a significant national purpose. Also, the federal government's jurisdiction to legislate pursuant to the national concern doctrine has recently been broadened in a case involving the pollution of

25. McLaren, *The Common Law Nuisance Actions and The Environmental Battle: Well-Tempered Swords or Broken Reeds?*, 10 OSGOODE HALL L.J. 505, 515 (1972).

26. At present, the Canadian courts have interpreted the class action rules to allow plaintiffs to form a class only if their damages are identical to each other. Ontario is in the process of drafting class action legislation which should be enacted sometime early in 1990. Through the Uniform Law Conference of provincial Attorneys General this is likely to be adopted by other provinces.

27. An Act Respecting the Class Action, QUE. REV. STAT. ch. R-2.1 (1979).

28. A. LINDEN, *supra* note 10, at 514. This is the case only where the nuisance is the inevitable consequence of an authorized activity. For example, legislation authorizing sewage lagoons would not allow for the creation of a nuisance, unless expressly so stated in the statute. *Von Thurn Und Taxis (Johannes Prinz) v. Edmonton*, [1982] 4 W.W.R. 457 (Alta. Q.B.).

marine water.²⁹

One area for federal regulation of groundwater is that of the management of the Yukon and Northwest Territories. The Northern Inlands Waters Act³⁰ creates the Yukon Territory Water Board and the Northwest Territories Water Board to provide for the conservation, development and utilization of the water resources of the Territories.³¹ Under this legislation water is defined to include both surface and underground water,³² and the Act contains a general prohibition against depositing waste in any waters or in any place under any conditions where the waste or any other waste that results from the deposit of the waste may enter any water.³³ The licenses under which such deposits of waste may be made are issued by these two water boards.³⁴

Another piece of federal legislation which has the potential to affect groundwater is the Canada Water Act.³⁵ Under this statute the federal Minister of the Environment may, with the approval of the Cabinet, enter into agreements with one or more provincial governments where there is a significant national interest in a water problem in Canada.³⁶ Such agreements may be made for the purpose of collecting water data, maintaining a water inventory, conducting water research, developing water resource plans or designing conservation projects.³⁷ The federal government may also undertake unilateral management projects if all reasonable efforts to achieve cooperation with a province have failed.³⁸ To date, however, no region has ever been designated a water quality management area under the Act, nor have any agreements been made with any province.³⁹ The federal government has also passed the Canadian Drinking Water Quality Guidelines⁴⁰ under this Act. These guidelines, however, are expressly stated to not be legally enforceable standards and are merely federal objectives for drinking water quality.

29. *Regina v. Crown Zellerbach Canada Ltd.*, [1988] 1 S.C.R. 401 (Can.).

30. R.S.C. ch. N-25 (1985).

31. *Id.* § 10.

32. *Id.* § 2(1).

33. *Id.* § 7(1).

34. *Id.* § 11(1).

35. R.S.C. ch. C-11 (1985).

36. *Id.* § 4.

37. *Id.* §§ 4, 7.

38. *Id.* § 6.

39. D. ESTRIN & J. SWAIGEN, *ENVIRONMENT ON TRIAL: A HANDBOOK OF ONTARIO ENVIRONMENTAL LAW* 150 (1978); (confirmed by Mr. Don Farley, Water Planning and Management Branch, Environment Canada).

40. Canadian Drinking Water Quality Guidelines 1987, *passed under* the Canada Water Act, R.S.C. ch. 5 (Supp. 1970).

The Ammonium Nitrate Storage Facilities Regulations⁴¹ and the Flammable Liquids Bulk Storage Regulations⁴² are passed pursuant to the National Transportation Act and the Railway Act, and both contain provisions that are aimed at groundwater protection. The first regulation states:

§ 20 The design, construction and maintenance of a storage facility shall be such as to prevent the normal ingress of rain and groundwater.

The latter regulation states:

§ 27(1) All storage tank shells shall be protected against corrosion by a suitable corrosion resistant coating. § 28 Below ground storage tanks shall be securely anchored or weighted when floating or moving of the tank due to changes in groundwater level is likely to be encountered.

Finally, the federal government regulates the operation of all garbage dumps on Indian reserve lands as well as the disposal or storage of any waste on such lands. These regulations set up a permit system and a range of penalties for operating such sites without a permit.⁴³ Similarly, the disposal of garbage and sewage in national parks is regulated by federal regulations which provide for the creation of garbage areas⁴⁴ and which prohibit the installation of a sewer without permission from the park superintendent.⁴⁵

2. Evaluation

Clearly, federal jurisdiction affecting groundwater is rather limited or, at least, has been interpreted by the federal government in a rather limited way. The federal government has direct authority over navigable waters, inter-provincial waters, oceans (within international limits) and, through its fisheries jurisdiction, can regulate the quality of water related to fish life.⁴⁶ It can assert indirect authority over provincial waters where critical conditions prevail and over contaminants when national health or welfare is being impaired.⁴⁷ To date, there have been few jurisdictional conflicts between the federal and provincial governments.⁴⁸ Future jurisdictional problems may be encountered where contaminated groundwater discharges into surface water under federal jurisdiction. Thus, ultimately, to protect the quality of surface water the federal government

41. CAN. CONS. REGS. ch. 1145 (1978).

42. *Id.* at ch. 1148.

43. Indian Reserve Waste Disposal Regulations, CAN. CONS. REGS. ch. 960 (1978).

44. National Parks Garbage Regulations, CAN. CONS. REGS. ch. 1123, § 6 (1978).

45. National Parks Water and Sewer Regulations, CAN. CONS. REGS. ch. 1134, § 9(2) (1978).

46. Fisheries Act, R.S.C. chs. C-8-14 (1985).

47. Constitution Act of 1867, § 91.

48. See, e.g., *Fowler v. Regina* [1980] 2 S.C.R. 213 (Can. 1979); *Regina v. Crown Zellerbach Canada, Ltd.* [1988] 1 S.C.R. 401 (Can.).

must know the quality of discharging groundwater. As one commentator has noted:

This means that the interactive groundwater-surface water system has to be defined in terms of both quantity and quality. . . . All provinces have installed networks of observation wells to monitor groundwater levels, but only in Saskatchewan and Alberta has there been a program to also monitor the long-term quality of groundwater in the major aquifer systems in a systematic way. . . . From the foregoing it is obvious that groundwater quality is still poorly defined in most of Canada, and that baseline data on the quality and changes in quality of groundwater discharging to the major surface water systems are essentially lacking.⁴⁹

B. Provincial Regulation

1. Description

The provincial ownership of natural resources allows the provinces to legislate with regard to the management of these resources and, therefore, to regulate pollution affecting groundwater. Provincial regulation of groundwater in Ontario will be considered in its three forms:

- a. General Prohibitions
- b. Specific Legislation
- c. Guidelines and Policies.

a. General Prohibitions

In all the provinces, there are statutes containing general prohibitions against the deposit of contaminants into water, which define water to include groundwater.⁵⁰ In Ontario, there are two such general prohibitions. Section 16(1) of the Ontario Water Resources Act ("OWRA") states:

§ 16(1) Every person that discharges or causes or permits the discharge of any material of any kind into or in waters or on any shore or bank thereof or into or in any place that may impair the quality of the waters is guilty of an offence.⁵¹

The definition of waters was only added to the OWRA in 1988 and states:

"waters" means a well, lake, river, pond, spring, stream, reservoir, artificial watercourse, intermittent watercourse, ground water or other water or watercourse.⁵²

49. J. VONHOF, *GROUND WATER ISSUES: AN OVERVIEW* 74-75 (1985).

50. See, e.g., *Clean Water Act*, ALTA. REV. STAT. ch. C-13 (1980); *Environmental Protection Act*, P.E.I. REV. STAT. ch. E-8.1 (1987).

51. ONT. REV. STAT. ch. 361, § 16(1) (1980), *amended by* Ont. Stat. ch. 54 (1988).

52. Ont. Stat. ch. 54, § 51 (1988).

An original drawback to the OWRA was that it did not bind Crown agencies, such as Ontario Hydro.⁵³ This situation was altered in 1988 and now the OWRA does bind the Crown.⁵⁴

Case law on the application of section 16(1) to groundwater contamination is not common. In *Regina v. Liverance*⁵⁵ the court considered the predecessor of section 16(1) and held that that section did apply to groundwater. In that case, the accused deposited two hundred drums of industrial waste in a sand pit on his property. The drums were buried only a few feet above the water table. The property was subsequently sold and the new owners detected noxious properties in their well water. The accused was found guilty on two charges and fined \$1,000 on each count. Considering how relatively recent this case is and how small the fine in comparison to the Province's cost of prosecuting the offense, this result was a slap on the wrist of no real deterrent value.⁵⁶ The cost of legally getting rid of this much industrial waste would have exceeded \$2,000 by a considerable margin.

The second general prohibition against environmental contamination in Ontario is contained in the Environmental Protection Act⁵⁷ (the "EPA"). Section 13(1) of the EPA states:

§ 13(1) Notwithstanding any other provision of this Act or the regulations, no person shall . . . discharge a contaminant or cause or permit the . . . discharge of a contaminant into the natural environment that, causes or is likely to cause [an adverse effect].

The EPA defines "natural environment" as meaning "the air, land and water, or any combination or part thereof, of the Province of Ontario."⁵⁸ Water is then defined as "surface water and groundwater, or either of them."⁵⁹ The conclusion is that section 13(1) does apply to groundwater contamination.

The court in *Regina v. Texaco Canada, Inc.*⁶⁰ considered the application of the predecessor of section 13(1) of the EPA to a case involving a leak of an underground storage tank. The previous section used the words "no person shall deposit, add, emit or discharge a contaminant"

53. Ontario Hydro is the electrical utility that has a monopoly on providing power in Ontario. It is owned by the Crown in right of the Province; hence it is referred to as a "Crown Corporation." Despite the corporation's name, about one-third of its generation is by nuclear plants, which run the risk of accidental discharges of radioactive water into the Great Lakes.

54. Ont. Stat. ch. 68, § 19 (1986).

55. [1986] 1 C.E.L.R. (N.S.) 97 (Ont. Prov. Ct.).

56. Figures obtained from the Ontario Ministry of the Environment show that the average fine for a conviction under section 16(1) of the OWRA has risen from \$3,921 in 1985 to \$6,740 in 1988.

57. ONT. REV. STAT. ch. 141 (1980), amended Ont. Stat. ch. 30 (1989).

58. *Id.* § 1(k).

59. *Id.* § 1(q).

60. [1986] 1 C.E.L.R. (N.S.) 100 (Ont. Dist. Ct.).

into the natural environment. The court held that this section was not violated as "[t]he words deposit, add, emit, and discharge require the intervention of energy to take place or the intervention of some outside power"⁶¹ and therefore a leakage fell outside the scope of former section 13(1) of the EPA. The former section was then amended to its present form to avoid the requirement of an "intervention of energy."

These prohibitions have the traditional problems associated with quasi-criminal legislation in that they require proof beyond a reasonable doubt, are subject to an array of defenses such as "due-diligence,"⁶² are lengthy and costly to prosecute and tend to result in insignificant fines. Worst of all, they only come into play after the fact, when the damage has been done, and thus have no real preventative value beyond perhaps general deterrence. Most of this polluting activity is likely to be undetected for many years and by the time it is detected, if ever, the culprits may well have gone bankrupt or simply have disappeared. While it is conceded that some form of prohibition against wilful contamination is indispensable, it should be seen as a last resort rather than a first line of defense.

b. Specific Legislation

The second level of statutory regulation takes the form of regulating those sources of pollution which either cause or affect groundwater contamination. These sources and how they are regulated by specific legislation will be discussed under the following headings:

EPA — Waste Management

EPA — Sewage Systems

EPA — Deep Well Disposals

EPA — Spills

Gasoline Handling Act — Underground Storage Tanks

Pesticides Act — Pesticides and Fertilizers

Mining Act — Tailings and Waste Streams

Environmental Assessment Act

i. EPA — Waste Management

The latest report by the Ontario Ministry of the Environment listed 2455 closed waste disposal sites, 1395 active disposal sites and 41 closed municipal coal gasification plant sites.⁶³ The leachate produced at these

61. *Id.* at 106.

62. *See Regina v. Sault Ste. Marie*, [1978] 2 S.C.R. 1299 (Can.).

63. ONTARIO MINISTRY OF THE ENV'T, WASTE DISPOSAL SITE INVENTORY 1 (1988).

sites is the main environmental concern as it can seriously affect the quality of groundwater. The leachate is produced by "decomposition of organic compounds and as a result of the direct introduction of water which dissolves soluble matter."⁶⁴ The type of leachate will depend on the type of waste deposited at the site and may be controlled by using drains or liners of low permeability.⁶⁵

Our state of knowledge of landfill sites has certainly increased over the last twenty years. It is accepted that each landfill site presents its own hydrogeological considerations and that leachate plumes may be contained safely in low permeability landfill materials. It is also accepted that waste may be safely landfilled even in high permeability situations with an understanding of groundwater flow patterns, although perhaps collection and treatment facilities will be necessary.⁶⁶ Also, the variability of each landfill site emphasizes the need for site specific studies.⁶⁷

"Waste management system" is a term used to describe the facilities, equipment and operations used in waste management. It is defined to include the "collection, handling, transportation, storage, processing and disposal" of waste⁶⁸ and is regulated under Part V of the EPA. "Waste disposal site" is defined in Part V of the EPA as meaning "any land or land covered by water upon, into, in or through which, or building or structure in which, waste is deposited or processed and any machinery or equipment or operation required for the treatment or disposal of waste."⁶⁹ "Waste" is defined to include "ashes, garbage, refuse, domestic waste, industrial waste, or municipal refuse and such other wastes as are designated in the regulations."⁷⁰

In terms of regulation, active and waste management systems or waste disposal sites require a certificate of approval or provisional certificate of approval issued under Part V of the EPA before they are operated.⁷¹ Also, a hearing before the Environmental Assessment Board is required for any waste disposal site for liquid industrial waste, hazardous

64. J. VONHOF, *supra* note 49, at 60.

65. See ENVIRONMENTAL PROTECTION SERV., ALBERTA DEP'T OF ENV'T GUIDELINES FOR INDUSTRIAL LANDFILLS (June 1987); ONTARIO MINISTRY OF THE ENV'T, MINISTRY GUIDELINE FOR ENGINEERED FACILITIES AT LANDFILLS THAT RECEIVE MUNICIPAL AND NON HAZARDOUS WASTE (Apr. 1988).

66. ONTARIO MINISTRY OF THE ENV'T, SOME HYDROGEOLOGIC CONSIDERATIONS IN LANDFILL SITE EVALUATION (1977).

67. J. BARKER, FINAL REPORT: THE OCCURRENCE AND MOBILITY OF HAZARDOUS ORGANIC CHEMICALS IN GROUNDWATER AT SEVERAL ONTARIO LANDFILLS 44 (1989).

68. Environmental Protection Act, ONT. REV. STAT. ch. 141, § 24(f) (1980).

69. *Id.* § 24(e).

70. *Id.* § 24(d).

71. *Id.* §§ 26-27

waste, or any domestic waste if it is the equivalent of not less than 1,500 persons.⁷² In order to minimize the effects of former disposal sites, Part V states that no use shall be made of land used for disposal of waste for a period of twenty-five years from the year that the land ceased to be used for the disposal of waste unless the approval of the Minister of the Environment has been given.⁷³

The Waste Management — General Regulations⁷⁴ sets out a classification for waste disposal sites⁷⁵ and for waste management systems.⁷⁶ Standards for the location, maintenance and operation of different types of waste disposal sites such as landfilling sites,⁷⁷ incineration sites,⁷⁸ dumps⁷⁹ and organic soil conditioning sites⁸⁰ are given by these regulations. For groundwater protection, the section dealing with landfill sites states:

§ 8.5. Waste shall be placed sufficiently above and isolated from the maximum water table at the site in such a manner that impairment of groundwater in aquifers is prevented and sufficiently distant from sources of potable water supplies so as to prevent contamination of the water unless adequate provision is made for the collection and treatment of leachate.

§ 8.6. Where necessary to isolate a landfilling site and effectively prevent the egress of contaminants, adequate measures to prevent water pollution shall be taken by the construction of berms and dykes of low permeability.

§ 8.7. Where there is a possibility of water pollution resulting from the operation of a landfilling site, samples shall be taken and tests made by the owner of the site to measure the extent of egress of contaminants and, if necessary, measures shall be taken for the collection and treatment of contaminants and the prevention of water pollution.

Similarly, the section dealing with organic soil conditioning sites states:

§ 12.4. The site shall be located so that the maximum level of the groundwater table at the site is at a sufficient distance below the surface to prevent the impairment of groundwater in aquifers as determined by the permeability of the soil.

§ 12.5. The site shall be at least 300 feet from any water wells.

The advantage of this type of control is that a certificate of approval is required before operation. Thus, in theory, it has the capacity to be preventative rather than merely remedial. Nevertheless, how well it

72. *Id.* § 30(1).

73. *Id.* § 45.

74. ONT. REV. REGS. Reg. 309 (1980).

75. *Id.* § 4.

76. *Id.* § 6.

77. *Id.* § 8.

78. *Id.* § 9.

79. *Id.* § 10.

80. *Id.* § 12.

works in a preventative capacity will depend on a number of factors, including the ease with which certificates of approval are granted, the efficiency of the approval granting process, adequacy of staffing of the approving bureaucracy, and, most important of all, the degree of discretion given to individual public servants. On this last issue, expert opinion is divided. For example, two of Canada's most distinguished groundwater scientists, in a very recent article in a U.S. publication, advocate greater flexibility and criticize the rigidity of technical requirements found in much of the U.S. legislation:

We are also of the opinion that many of the legislative packages are too rigid in their technical requirements. Every site is different and every hydrogeological environment presents special circumstances.⁸¹

To allow every site different treatment means that legislation and regulations must be designed so as to grant a large amount of discretion either to individual public servants or to the Environmental Assessment Board. This means that they, or their political masters, will be subject to intensive pressure by developers of landfill sites and municipal politicians to exercise their discretion in favor of or against the local development. Although Freeze and Cherry were talking about the situation in the U.S., in this respect it is not likely to be any different in Canada.

On the other side of the issue, J.A. Vonhof has argued against granting any significant discretion. On the premise that environmental regulations do no good unless they are properly enforced, he observes:

Unlike American environmental legislation, which is relatively specific and detailed, Canadian environmental laws are more general and their enforcement depends in many instances on the discretion of government officials. It is therefore conceivable that a polluter can continue to contaminate at will until he is stopped by someone prepared to take action.⁸²

He then goes on to cite an article in the *Calgary Herald* newspaper of January 23, 1985 to the effect that federal government agencies and Crown corporations were responsible for thirty-three percent of the 700 fuel and chemical spills that occurred across the Northwest Territories in the last decade, and that of all of the spills caused by government agencies and industry combined, less than one percent were taken to court under the numerous environmental laws and regulations. Even in Prince Edward Island, where almost all water used is groundwater, several federal government buildings have fuel tanks installed which are not corrosion-resistant, contrary to the government's own Environmental

81. Freeze & Cherry, *What Has Gone Wrong*, 27 GROUND WATER 458, 460 (1989).

82. J. VONHOF, *supra* note 49, at 75.

Protection Service Guidelines. Vonhof concludes: "These examples illustrate that there is a need to strengthen environmental laws and remove discretion from enforcement."⁸³

In the writers' view, how much discretion to grant a public servant is a difficult balancing act. If the regulations are too detailed and specific they are bound to produce absurd results in situations unanticipated when the regulations were drafted. For example, Freeze and Cherry point out that "most of the legislation predates our emerging understanding of the subsurface behaviour of dense nonaqueous-phase liquids (DNAPL's) such as chlorinated solvents, coal tar, creosote, and PCB oils. [W]here DNAPL's are prevalent and hydrogeological conditions perverse, it might be possible to meet all the legal remedial requirements . . . without decreasing the long-term potential for regional ground-water contamination."⁸⁴

It would appear that the more frequently regulations are reviewed, the more likely it is that they will remain current and that it will not be necessary to give bureaucrats such wide latitude that they will be subject to all sorts of political pressures. In Canada, where Crown corporations and municipal and provincial governments can themselves create major groundwater contamination problems, the more discretion given to individual bureaucrats, the less likely it is to be in their career interests to exercise it against their political masters. Thus, although there are costs associated with rigidity as well as with flexibility, on balance, very limited discretion under frequently reviewed regulations would appear to be the lesser of two evils.

ii. EPA — Sewage Systems

Industrial and domestic sewage disposal has the potential to contribute bacteria and other micro-organisms as well as organic material and nitrates to groundwater.⁸⁵ Sources of these contaminants include septic tanks, leaking sewage lines and manure piles.⁸⁶

Private sewage disposal systems in rural parts of Ontario not connected to municipal systems are regulated by Part VII of the EPA.⁸⁷ A private sewage work, such as a septic tank which discharged to ground-

83. *Id.* at 76.

84. Freeze & Cherry, *supra* note 81, at 460.

85. C. Pupp & G. Grove, *supra* note 2, at 16.

86. *Id.*

87. A sewage system, for the purpose of this section, is defined in section 62 of the Environmental Protection Act to include privies, privately owned sewage works serving only five residences or fewer, sewage works which drain otherwise than into a ditch, drain, well, lake, river, spring, stream, reservoir, or other water (other than ground water) or water course or any other facility or land for

water, would therefore be governed by this section and also by the Sewage Systems Regulation.⁸⁸

Under Part VII of the Act a certificate of approval must be granted for the operation or extension of a private sewage system.⁸⁹ The director may refuse to issue the certificate of approval if he or she is of the opinion that the sewage system will result or is likely to result in "impairment of the quality of the natural environment for any use that can be made of it."⁹⁰ This Part also provides that no person shall operate a sewage system without a permit that is obtained following an inspection of the sewage system by a provincial officer.⁹¹ Persons engaged in the business of constructing, installing, repairing, cleaning, storing, handling or disposing of sewage for a sewage system must obtain a license from the director.⁹² Finally, a municipality may enter into an agreement with the Ministry to issue these certificates of approval or to issue these permits.⁹³

The classification of private sewage systems is set out in section 2 of the Sewage Systems Regulation.⁹⁴ This regulation sets out the construction and operating standards for each such sewage system.⁹⁵ For example, standards for the construction of leaching beds for septic tank systems are specified in detail and the regulation states that "[n]o person shall locate or cause or permit the location of the leaching bed, where the effluent from the leaching bed would cause impairment of the ground water."⁹⁶

Public sewage works are also regulated under the OWRA and defined as "any works for the collection, transmission, treatment and disposal of sewage, or any part of any such works."⁹⁷ This part of the OWRA also requires approval of the Director before any person establishes, alters, extends or replaces new or existing sewage works.⁹⁸

the treatment or disposal of sewage. Environmental Protection Act, ONT. REV. STAT. ch. 141, § 62(a) (1980).

88. Ont. Regs. Reg. 374 (1981).

89. Environmental Protection Act, ONT. REV. STAT. ch. 141, § 64 (1980), *amended by* Ont. Stat. ch. 52, § 9 (1983).

90. *Id.* § 66(e).

91. *Id.* § 67(2).

92. *Id.* § 69(1).

93. *Id.* § 70(2)(a)-(b).

94. Ont. Regs. Reg. 374 (1981).

95. *Id.* §§ 6-13.

96. *Id.* § 10(2)(1)(iv).

97. Ontario Water Resources Act, ONT. REV. STAT. ch. 361, § 1(s) (1980), *amended by* Ont. Stat. ch. 54 (1988).

98. *Id.* § 24(1).

iii. EPA — Deep Well Disposals

Deep well disposal refers to the discharge of liquid waste into a geologic formation.⁹⁹ In Ontario, deep well disposal is a common technique for the disposal of brines, especially in the Sarnia area.¹⁰⁰ Injection wells are also used in the oil industry to dispose of produced water or as a secondary or tertiary oil recovery technique. Problems with this type of disposal include the contamination of usable aquifers, contamination of other zones from fractures and the formation of fractures by excessive pressure.¹⁰¹

Regulation 303, promulgated under the EPA, designates a deep well disposal site as a waste disposal site.¹⁰² As such, Part V of the EPA applies and therefore no person shall operate, establish, alter, enlarge or extend a waste disposal site unless a certificate of approval has been issued.¹⁰³ This regulation also gives the standards for the location, maintenance and operation of all deep well waste disposal sites.¹⁰⁴ The regulation makes a further stipulation that all wells used for deep well disposal conform to the requirements of the Petroleum Resources Act and specifically conform with regulation 752 of the Revised Regulations of Ontario.¹⁰⁵ This latter statute specifically states that:

§ 37(1) No person shall dispose of mineral water in an underground formation without the approval of the Minister.

(2) Wells for the disposal of mineral water shall be cased and cemented in such a manner as to prevent the mineral water from entering any formation not approved under subsection (1).

According to section 46(3) of the EPA, every owner of a well that is a waste disposal site must pay a fee into The Waste Well Disposal Security Fund. The Fund is intended to compensate persons whose well water becomes unfit for use by reason of, among other things, any well that is a waste disposal site.¹⁰⁶

iv. EPA — Spills

Spills of chemicals have the potential of entering the water table and therefore could seriously impair groundwater quality. Part IX of the EPA is known as the "Spills Bill" and contains the regulatory scheme for

99. ONT. REV. REGS. Reg. 303, § 1(b) (1980).

100. C. Pupp & G. Grove, *supra* note 2, at 13.

101. *Id.*

102. ONT. REV. REGS. Reg. 303, § 4 (1980).

103. Environmental Protection Act, ONT. REV. STAT. ch. 141, § 27 (1980).

104. ONT. REV. REGS. Reg. 303, § 5 (1980).

105. *Id.* Reg. 752.

106. Environmental Protection Act, ONT. REV. STAT. ch. 141, § 46(9) (1980).

reporting, cleaning up and compensating victims for damage resulting from spills.¹⁰⁷

The first duty imposed under this Part is that every person having control of a pollutant must notify the Ministry of the spill, as well as the municipality and the owner in control if they did know about it. The purpose of notification is to ensure a quick and complete cleanup.¹⁰⁸

The second duty is that the owner or person in control of the pollutant "do everything practicable to prevent, eliminate and ameliorate the adverse effects and to restore the natural environment."¹⁰⁹ The EPA defines restoring the natural environment as restoring all forms of life, physical conditions, the natural environment and things immediately before the spill of the pollutant that are affected or may reasonably be expected to be affected by the pollutant.¹¹⁰ Of course, words like "do everything practicable" are inherently subjective and undefinable. Also, the words "prevent, eliminate and ameliorate" fail to specify which one must be done. Therefore, it may be good enough to ameliorate rather than to prevent or eliminate. Indeed, with a serious spill, it may be impossible to restore the natural environment if a significant underground plume has contaminated a sizeable area of groundwater. If, for example, the spill involved an acid which, at least theoretically, could be neutralized by a base, the result might produce a salt by-product, which would still not be the same as complete restoration of the natural environment.

This part of the EPA has only recently been proclaimed into force¹¹¹ and hence its enforcement and the jurisprudence arising under it are still too limited to provide an evaluation as to how well it will work in general, let alone in the special situation of groundwater.

Civil liability for the spill is imposed on the owner or person having control of the pollutant for loss or damage incurred as a direct result of the spill.

In terms of compensation, the EPA allows persons carrying out or attempting to carry out an order under Part IX to claim compensation from the Province of Ontario. Compensation may also be claimed from

107. *Id.* §§ 79-112. A spill is defined broadly to include the discharge of a pollutant that is "abnormal in quality or quantity in light of all the circumstances of the discharge." *Id.* § 79(1)(j). Pollutant is defined as "a contaminant other than heat, sound, vibration or radiation, and includes any substance from which a pollutant is derived." *Id.* § 79(1)(f). Contaminant is also defined broadly in the Act as "any solid, liquid, gas, odour, heat, sound, vibration, radiation or combination of any of them resulting directly or indirectly from human activities that may cause any adverse effect." *Id.* § 1(c).

108. S. MAKUCH, *THE SPILLS BILL — AN OVERVIEW* 28 (1986).

109. Environmental Protection Act, ONT. REV. STAT. ch. 141, § 81 (1980).

110. *Id.* § 79(i).

111. Proclaimed in force Nov. 29, 1985.

the Environmental Compensation Corporation which is established pursuant to section 99 of the EPA. Persons who incurred loss or damage as a direct result of the spill, persons incurring expenses in carrying out Ministry's orders or even the owner of the pollutant paying out compensation may apply to the Compensation Corporation for compensation.¹¹²

With regard to carrying out any of the above duties imposed by the EPA, no person shall "dispose of or use any pollutant, or any matter, thing, plant or animal or any part of the natural environment that is affected or that may reasonably be expected to be affected by the pollutant except" with the approval of the director or Minister.¹¹³

Part IX does not make the act of spilling an offense, possibly in an effort to encourage notification and cleanup of the spill. However, failure to notify the Ministry or to do everything practicable to ameliorate the spill after it occurred would seem to be a contravention of the Act and therefore constitute an offense under section 146 of the Act.¹¹⁴ Also, an accidental spill constitutes an offense under the general prohibition against discharging a contaminant into the environment.¹¹⁵

While it is recognized that this discussion on spills does not apply specifically to groundwater, groundwater is affected by this section of the EPA to the extent that any spill has the potential to affect groundwater.

v. Gasoline Handling Act — Underground Storage Tanks

According to one source, a small amount of gasoline can easily contaminate a large amount of drinking water.¹¹⁶ The problem with gasoline leaks is that often the contamination of the aquifer by gasoline is in the vapor phase, which makes clean-up very difficult.¹¹⁷ The primary causes for such leaks have been unprotected steel tanks and piping corroding over time. Again, the exact information as to the scope of this problem is unknown with estimates of the percentage of leaking tanks ranging from five percent to thirty-five percent.¹¹⁸

In Ontario the handling of gasoline is governed by the Gasoline Handling Act.¹¹⁹ This statute states that all containers holding gasoline

112. Environmental Protection Act, ONT. REV. STAT. ch. 141, § 87 (1980).

113. *Id.* § 84(1).

114. General prohibition against contravening the Environmental Protection Act or the regulations.

115. *Regina v. Power Tank Lines Ltd.*, 23 C.C.C.2d 464 (Ont. Prov. Ct. 1975).

116. C. Pupp & G. Grove, *supra* note 2, at 14.

117. Cherry, *Groundwater Occurrence and Contamination in Canada*, CAN. AQUATIC RESOURCES 387 (Dec. 1986).

118. C. Pupp & G. Grove, *supra* note 2, at 14.

119. ONT. REV. STAT. ch. 185 (1980), amended by Ont. Stat. ch. 49 (1988).

must conform with the regulations which set the standards for installations and materials for all new storage tanks.¹²⁰ Since May 1, 1974, all owners of steel underground tanks have had to protect the tanks from corrosion, monitor the tanks,¹²¹ and comply with the installation requirements set out in the regulations.¹²² All underground unprotected steel tanks installed prior to 1974 must be removed or upgraded by January 1, 1991.¹²³ A recent amendment to the Gasoline Handling Act states that no person, after January 1, 1991, shall use or put gasoline in an underground tank unless the tank has been approved by the Director.¹²⁴ One may obtain such approval by filing proof with the Director that the tank has been protected from external corrosion.¹²⁵ The amended statute also states that every person supplying gasoline or an associated product to an underground tank shall provide the name and address of the purchaser to the Director.¹²⁶ This amendment is aimed at determining where all the underground storage tanks are located.

To facilitate the detection of underground leaks, gauge and dip tests must be made and records of these tests kept for at least two years.¹²⁷ If a tank owner suspects that a leak has sprung, the tank owner must arrange for a recorded pressure test, and if there is any doubt as to whether there is a leak, then the tank must be uncovered to allow a visual inspection.¹²⁸ The regulation requires that the tank be repaired or replaced, that all reasonable efforts be taken to recover escaped product and to remove product-contaminated soil and that the nearest fire prevention authority be notified within twenty-four hours.¹²⁹

In other provinces, such as Alberta, the regulation of underground gasoline storage tanks is governed by the Fire Code provisions. The danger with this type of incidental regulation is that groundwater pollution may not be the primary purpose of the regulation and therefore groundwater may not be protected as well as it could be.¹³⁰

vi. The Pesticides Act — Pesticides and Fertilizers

A recent unpublished federal report stated that out of sixty-nine re-

120. *Id.* § 3.

121. ONT. REV. REGS. Reg. 439, § 7(8) (1980).

122. *Id.* § 7(39).

123. ONT. REV. REGS. Reg. 439 (1980), *amended by* Ont. Regs. 436/82, § 6 (1982).

124. Ont. Stat. ch. 49, § 5 (1988).

125. ONT. REV. REGS. Reg. 436/82, § 6(51) (1982).

126. *Id.*

127. ONT. REV. REGS. Reg. 439 (1980), *amended by* Ont. Regs. 136/81, § 1 (1981).

128. ONT. REV. REGS. Reg. 439, § 8(35)(c) (1980).

129. *Id.* § 8(35)(g)-(h).

130. D. PERCY, *supra* note 24, at 36.

ported cases of groundwater contamination, five cases were traceable to the use of pesticides and fertilizers.¹³¹ In one case, alachlor, a pesticide banned in 1986, was found in rural well water in Ontario and in another case aldicarb, which is used to prevent potato rot, was found in groundwater in Prince Edward Island.¹³² Another study found that out of a random sample of ninety-one farm wells in southern Ontario, twelve wells were contaminated, primarily by the pesticide atrazine and its decomposition products.¹³³

Pesticides find their way into groundwater not only through direct application to the soil but also through spills, spray drifting, back-siphoning, and surface run-off. As with many groundwater related problems, "it has proved to be very difficult to obtain data on the actual amount, type, and composition of pesticides used in various provinces."¹³⁴

Of the three main components of fertilizer, nitrogen, potassium, and phosphorus, nitrogen in the form of nitrate is the potential contaminant of greatest concern.¹³⁵ The reason is because it interacts less with the soil and travels very quickly in groundwater. Despite the fact that the Canadian Drinking Water Quality Guidelines recommend ten milligrams per liter¹³⁶ as the maximum acceptable concentration of nitrate in drinking water, forty percent of wells tested in one study exceeded this limit.¹³⁷

In Ontario pesticides are regulated by the Pesticides Act, which contains a general prohibition that no person, whether acting with or without a license, shall discharge a pesticide into the environment that causes or is likely to cause impairment of the quality of the environment.¹³⁸ The Pesticides Act further requires any person who sells pesticides or performs an extermination to obtain a license.¹³⁹ The issuance of these licenses is governed by a director who is appointed by the Minister of the Environment.¹⁴⁰ Water is defined in this Act as meaning "surface water and ground water, or either of them."¹⁴¹ Licensed operators are required

131. D. Neufeld, *Groundwater: Its Management and Protection in Ontario* 3 (July, 1987) (available in Ontario Legislative Library).

132. *Id.* at 10-11.

133. C. Pupp & G. Grove, *supra* note 2, at 18.

134. J. VONHOF, *supra* note 49, at 45.

135. C. Pupp & G. Grove, *supra* note 2, at 19.

136. Canadian Drinking Water Quality Guidelines (1987), passed under the Canadian Water Act, ONT. REV. STAT. ch. 376, § 4(a) (1980), *amended by* Ont. Stat. ch. 54, § 90 (1988).

137. C. Pupp & G. Grove, *supra* note 2, at 20.

138. ONT. REV. STAT. ch. 376, § 4(a) (1980), *amended by* Ont. Stat. ch. 54, § 90 (1988).

139. *Id.* §§ 5-6.

140. *Id.* §§ 3, 11.

141. *Id.* § 1(1)(y).

to insure themselves against liability or to furnish a bond as required by the regulations¹⁴² and Ministry officials have broad powers to issue stop and control orders under provisions of this Act.¹⁴³ In terms of notification requirements, section 22 of the Act states that the Director shall be notified after any discharge of a pesticide into the environment that causes or is likely to cause impairment of the environment. The Pesticides Act also sets up the Pesticides Advisory Committee to review annually the Act and to recommend changes to the regulations.¹⁴⁴

The Pesticides (General) Regulation states that no person shall use water from a lake, river or other surface water unless the extermination equipment is equipped with a device to prevent back-flow.¹⁴⁵ The regulation also states that no person shall wash equipment such that water may be discharged into any lake, river or other surface water.¹⁴⁶ The omission of groundwater from this section seems like an obvious oversight by the Legislature and ignores the fact that over ninety percent of rural farms in Canada use groundwater.¹⁴⁷ The regulations also state that containers that held pesticides shall be disposed of by puncturing or breaking the container and then burying it under at least fifty centimeters (roughly two feet) of soil as long as it is not near any water course or water table.¹⁴⁸

The use of fertilizers is not expressly regulated by statute or regulation in Ontario and, therefore, the general water pollution prohibitions contained in section 16(1) of the OWRA and section 13(1) of the EPA would have to be relied upon in a case of groundwater contamination from fertilizers.

vii. The Mining Act¹⁴⁹ — Tailings and Waste Streams

Contaminated groundwater from mining activities is primarily associated with mine drainage, leachate from tailing storage areas, mill water and tailings disposal. The specific groundwater contamination problem will depend on the type of mining involved. The major groundwater problems in metal mining are release of metals into the environment, leachate from tailings storage and waste solutions from mining opera-

142. ONT. REV. REGS. Reg. 751, § 19 (1980).

143. Pesticides Act, ONT. REV. STAT. ch. 376, §§ 20-21 (1980).

144. *Id.* § 10.

145. ONT. REV. REGS. Reg. 751, § 22 (1980).

146. *Id.* § 23.

147. Hess, *supra* note 1, at 7.

148. ONT. REV. REGS. Reg. 751, § 25(1)(a) (1980).

149. ONT. REV. STAT. ch. 268 (1980), *amended by* Ont. Stat. ch. 48 (1988).

tions.¹⁵⁰ Mining operations such as mine shafts and open surface pits will also change the flow of groundwater and thereby affect the rate of groundwater contamination. Tailings from sulphide-containing compounds often produce an acidic waste stream which not only is a source of groundwater contamination but also may cause dissolution of compounds into the groundwater and thereby speed up groundwater contamination. Other potential groundwater contaminants include cyanides from gold production and sulphur from base metal production.

In Ontario, the Mining Act regulates several phases of mining that undoubtedly have an impact on the quality of groundwater in the province. This Act states that a person responsible for a mine, a mill or a quarry can, with the consent of a mining commissioner, deposit tailings, slimes and other waste products upon any land or discharge them into any waterway so long as the effects of such deposits are not injurious to life or health.¹⁵¹ It should be mentioned however that this section must now be read subject to section 13(1) of the EPA which prohibits discharge of any contaminant that is likely to impair the quality of the environment. Section 139 of the EPA also states that a provision of the EPA prevails in cases of conflict with other statutes or regulations.¹⁵² Provincial guidelines concerning mining effluents are discussed later in this paper.

Finally, the definition of "sewage" under the OWRA includes commercial and industrial wastes.¹⁵³ As such, the collection, transmission and treatment of mine tailings is covered by the broad definitions of "sewage" and a "sewage work,"¹⁵⁴ which means that approval of the Director under section 24 of the OWRA is required when collecting or treating mine tailings.¹⁵⁵

A statute which has not yet been proclaimed, but which will affect groundwater quality in Ontario, is the Aggregate Resources Act of 1989.¹⁵⁶ This Act governs the issuance of licenses and permits for the operation of pits and quarries on Crown Land, private land designated under either the Pits and Quarries Control Act or this Act and on land under water.¹⁵⁷ Any person applying for a license to excavate aggre-

150. D. ESTRIN & J. SWAIGEN, *supra* note 39, at 162.

151. Mining Act, ONT. REV. STAT. ch. 268, § 189 (1)(i) (1980).

152. Environmental Protection Act, ONT. REV. STAT. ch. 141, § 139 (1980).

153. Ontario Water Resource Act, ONT. REV. STAT. ch. 361, § 1(r) (1980), *amended by* Ont. Stat. ch. 54, § 90 (1988).

154. *Id.* § 1(s).

155. *Id.* § 24.

156. Bill 170, Ont. Stat. ch. 23 (received Royal Assent June 20, 1989).

157. *Id.* § 5(1).

gates¹⁵⁸ from a pit or quarry must submit an application to the Minister of Natural Resources,¹⁵⁹ and this application must show:

- § 8(o) the water table and any existing surface water on and surrounding the site and proposed water diversion, storage and drainage facilities on the site and points of discharge to surface waters;
- (p) subject to available information, the location of water wells on and within 300 meters of the site;
- (q) the maximum depth of excavation and whether it is intended to excavate below the water table.¹⁶⁰

The Minister in considering whether to issue or refuse a license shall have regard to:

- § 12(e) any possible effects on ground and surface water resources.¹⁶¹

It is still too early to assess the extent to which groundwater and hydrogeologic considerations will be considered in the issuance of these licenses or the extent to which groundwater quality will be affected.

viii. Environmental Assessment Act

The Environmental Assessment Act creates the Ontario Environmental Assessment Board, whose function is to conduct public hearings to assess the prospective environmental impacts of projects, both major and minor. In some cases the Environmental Assessment Board sits jointly with members of the Ontario Municipal Board¹⁶² in order to provide a project proponent with "one stop shopping" in that all environmental and planning approvals can be obtained (or refused) in one hearing.

The formal process begins with an environmental assessment which is submitted to the Ministry for evaluation. The Ministry then coordinates a review by various public agencies. Assuming that the environmental assessment is properly prepared and comprehensive, it can be approved without a hearing or proceed to a hearing before the Environmental Assessment Board. Such a hearing may take days, weeks or even months. However, not all projects are submitted through this process and some major ones have been exempted.¹⁶³ What is included or exempted is largely a political decision, although modestly constrained by a non-political advisory committee. Although this process is not specifi-

158. Aggregates are defined as "gravel, sand, clay, earth, shale, stone, limestone, dolostone, sandstone, marble, granite, rock other than metallic ores, or other prescribed material." *Id.* § 1(1).

159. *Id.* § 7.

160. *Id.* § 8.

161. *Id.* § 12.

162. See Consolidated Hearings Act, Ont. Stat. ch. 20, § 4 (1981).

163. One example of a major exemption is the Darlington Nuclear Power Station, the cost of which exceeded 13 billion dollars.

cally aimed at groundwater protection, it would be one of the impacts which should, in the normal course, be considered.

c. Guidelines and Policies

As if the legislation and regulations which have thus far been described are not difficult enough to enforce, we now come to the ultimate problem of enforceability: guidelines and policies.

i. The Blue Book

The Ontario Ministry of the Environment's policies and objectives on groundwater quality management are contained in a Ministry publication entitled *Water Management — Goals, Policies, Objectives and Implementation Procedures of the Ministry of the Environment*,¹⁶⁴ which is nicknamed the "Blue Book."

The goal of the Ministry of the Environment ("MOE") with respect to groundwater is "to protect the quality of groundwater for the greatest number of beneficial uses."¹⁶⁵ This publication recognizes that "[i]n the majority of cases, human consumption will be the most important use of water to be protected, but there are other groundwater uses such as agriculture . . . which will also [have to] be protected."¹⁶⁶ The Blue Book also sets out the Ontario Drinking Water Objectives and the water quality criteria for agricultural uses.¹⁶⁷ Like the federal drinking water guidelines, these objectives have no legal effect and represent only provincial policy on drinking water quality.

For regulated sources of groundwater contamination, Policy 1 in the Blue Book states that "water quality degradation will be controlled in order to protect reasonable uses, existing or proposed, of both ground and surface waters."¹⁶⁸ What constitutes "reasonable use on adjacent property" is set forth in a second Ministry guideline, discussed in the next section of this paper. The waste control requirements for these regulated sources are to be determined on a case-by-case basis and then stipulated in the Certificate of Approval.¹⁶⁹

Control of unregulated sources is recognized as "a difficult but important aspect of the groundwater quality management program."¹⁷⁰

164. ONTARIO MINISTRY OF THE ENV'T, *WATER MANAGEMENT: GOALS, POLICIES, OBJECTIVES AND IMPLEMENTATION PROCEDURES OF THE ENVIRONMENT* (1984).

165. *Id.* at 7.

166. *Id.*

167. *Id.* at 32.

168. *Id.* at 8.

169. *Id.*

170. *Id.* at 28.

This would include all activities such as salt storage areas, crop fertilization and unreported leaks and spills which are not covered under either the EPA or the OWRA. Policy 2 states that definitive solutions are not yet available but "various studies are currently addressing these issues."¹⁷¹ It then states that "[p]ending the results of these and other studies, all reasonable measures shall be undertaken to reduce or prevent the contamination of groundwater from these sources."¹⁷²

In addition, this publication states that "[i]n cases where urban run-off or treated sewage are to be recharged to ground water, the chemical suitability of the recharge waters should be determined to ensure that toxic chemicals are not present in excessive amounts."¹⁷³ Also, applicants "for a waste disposal facility may be required to monitor ground water quality to provide background data on natural water" at public hearings.¹⁷⁴ The precatory language used in these policy statements is less than reassuring.

ii. The Incorporation of the Reasonable Use Concept into
Groundwater Management Activities of the Ministry of
Environment

This guideline is intended to explain the "reasonable use" concept and its application to Ministry activities such as the issuing of Certificates of Approval for landfill sites. It also explains the phrase "[d]egradation of groundwater quality will be controlled to protect . . . reasonable uses of water on adjacent property" found in Policy 1 of the Blue Book.¹⁷⁵ The guideline applies chiefly to proposed landfills, operating landfills, landfills requesting approval for expansion, extra filtration lagoons and large subsurface sewage systems, which are all regulated activities by the Ontario Ministry of the Environment.

In most cases, the reasonable use of groundwater will be for domestic consumption but other uses such as for agricultural purposes are possible. The decision as to the reasonable use will be made after considering the present use of the groundwater as determined by an area survey; its potential use, based on quality and quantity now present in the vicinity and current use in the area; and the amount and quality of groundwater that is available in the area.¹⁷⁶

171. *Id.*

172. *Id.*

173. *Id.*

174. *Id.*

175. *Id.* at 27.

176. ONTARIO MINISTRY OF THE ENV'T, THE INCORPORATION OF THE REASONABLE USE

For the purposes of this guideline, in an application for a land disposal site the Ministry considers the site and the contaminant attenuation zone at the adjacent property. The contaminant attenuation zone designation is meant to allow the limited impairment of off-site property by means of easements but this is to occur only in exceptional cases. The guideline states that the "[d]ischarge of contaminants (leachate) to [a]djacent [p]roperty will have no more than a negligible effect on the present or potential reasonable use of that property."¹⁷⁷

The determination of the reasonable use of groundwater is made on a case-by-case basis because of the wide variation in factors of quality and quantity of groundwater. Once the reasonable use is determined, the amount of degradation of groundwater on adjacent property which will be allowed is determined as follows:

Quality cannot be degraded by an amount in excess of 50% of the difference between background and the quality criteria for any designated reasonable use except drinking water. In the case of drinking water, the quality must not be degraded by an amount in excess of 50% of the difference between background and the Provincial Drinking Water Objectives for non-health related parameters and in excess of 25% of the difference between background and the Provincial Drinking Water Objectives for health-related parameters. Background is considered to be the quality of the groundwater prior to any man made contamination.¹⁷⁸

The guideline lists the following technical considerations about groundwater contamination that were taken into account while developing this guideline:

1. The uncertainty factors in establishing the quality and quantity of groundwater are as high as five times and therefore large safety factors should be used in estimating groundwater discharge.
2. It is not necessary to degrade any substantial groundwater resource by waste disposal.
3. Allocation of all of the attenuation capacity in a particular area to a single source of contaminants may not be prudent.
4. Contingency plans should exist for alleviating unacceptable environmental impacts.
5. Certain environments are unsuitable for waste disposal.¹⁷⁹

An opportunity for a practical application of the reasonable use concept came in the Halton Landfill decision,¹⁸⁰ which was the first landfill

CONCEPT INTO GROUND WATER MANAGEMENT ACTIVITIES OF THE MINISTRY OF THE ENVIRONMENT 3 (1986).

177. *Id.* at 13.

178. *Id.* at 16.

179. *Id.* at 6-7.

180. Decision of the Joint Board under the Consolidated Hearings Act of 1981, in the matter of an application by the Regional Municipality of Halton for a landfill site, Feb. 24, 1989.

application to go to a full public hearing under the Consolidated Hearings Act of 1981. The reasonable use concept, despite being raised in evidence by counsel for the Ministry of the Environment, was not mentioned at all in the Board's 210-page decision. This has led to uncertainty as to whether such omission amounts to an implicit rejection of this policy guideline or merely a rejection of its application to the particular facts of the case before the Board.

Hydrogeologic considerations comprised fifty-eight pages of the 210-page decision. In assessing the hydrogeologic suitability of a landfill site, the Board considered the following factors to be important:

1. The hydrogeology of the area must be comprehensible to the Board.
2. The loss of contaminants should be minimal (and preferably zero), as a result of either natural containment or engineered works.
3. Natural containment and attenuation of contaminants is preferred to engineered containment and attenuation.
4. If it is predicted that contaminants may move away from a landfill site, then the postulated contamination migration pathways should be predictable.
5. It should be demonstrated that predicted leachate migration from the site will have no significant adverse impact on surface waters.
6. Monitoring to identify contaminant escape and migration pathways should be straightforward.
7. There should be the highest possible confidence in the effectiveness of contingency measures to intercept and capture lost contaminants.¹⁸¹

Finally, while a decision of a Joint Board is not binding on subsequent boards, it is reasonable that the Halton Landfill decision will be looked to for guidance by future boards in cases involving landfill applications.

Vonhof is justifiably critical of the "reasonable use" concept. He points out that:

- The concept of "reasonable use" is concerned only with the present and immediately foreseeable future, but does not address long-term demographic and economic developments.
- The standards for the protection of the quality of groundwater are discretionary. . . . [T]he status of present and potential use of the groundwater resource under the land adjacent to a waste disposal facility can readily be changed . . . for example, by providing water of equal or better quality from an alternate source . . . or by rezoning the adjacent land for a different land use. In both instances the use status of the groundwater resource is changed to such an extent that quality maintenance is no longer necessary and it can therefore be allowed to deteriorate.

181. *Id.* at 109-12.

- Aquifers with groundwater of a quality better than the [P]rovincial [D]rinking [W]ater [G]uidelines are allowed to be contaminated to a certain degree. . . . On the other hand, no special effort is made to improve the quality of groundwater in aquifers where it is below that specified in the guidelines. . . . In other words: excellent quality does not have to be maintained and poor quality is acceptable as long as it does not deteriorate further.
- Groundwater is part of the hydrologic cycle and . . . provides a significant contribution to the surface water resources. If surface water resources are to be protected because of their significant economic value as a source of fresh water, it makes little sense to contaminate one of its main inputs.¹⁸²

"It is obvious," Vonhof states, "that waste-disposal site selection cannot be done on a case-by-case basis, but that the regional impact on both the groundwater and surface-water resources must be considered. . . . Most . . . hydrogeologists [would] agree that in order to protect the groundwater resources the best approach is to keep contaminants out in the first place."¹⁸³ Vonhof concludes:

In summary, the "reasonable use" concept of groundwater management is unreasonable, because it allows contamination of the shallow subsurface and does not offer sufficient protection of the groundwater resources for the future.

If groundwater resources are considered a vital source of fresh water for the present and the future, then industrial development, urban growth, use of agricultural chemicals, density of livestock, disposal of waste, etc., will have to be planned and controlled to maintain and protect the quality of that water.¹⁸⁴

iii. The Resolution of Groundwater Quality Interference Problems

This publication gives guidelines and procedures for the resolution of groundwater contamination problems. It defines environment to include water within the subsurface and then states that it is the responsibility of the Ministry of the Environment to resolve groundwater contamination problems as quickly as possible. This guideline makes it clear, however, that it is the owner of the contaminant who should pay all costs associated with the clean-up.

To resolve a groundwater contamination problem, an action plan is to be prepared outlining the scope, timing and method of the investigation, clean-up and restoration. The level of clean-up that the MOE will undertake will be decided on a case-by-case basis depending on factors such as the availability of alternate water supplies, toxicity of the con-

182. J. VONHOF, *supra* note 49, at 77-79.

183. *Id.* at 79.

184. *Id.*

taminants, practicability of treating contaminated groundwater supplies, number of people affected, quality of natural groundwater in the area, cost of clean-up and potential impact on other activities.¹⁸⁵

Other operational considerations in dealing with a groundwater contamination problem such as the use of consultants and contractors and certification of persons involved and the restoration of a permanent water supply are outlined in this paper. Methods of permanent water supply restoration might include:

1. Connection to a municipal supply.
2. Drilling a new well, reconstruction or deepening of an existing well.
3. Treatment of the contaminated supply.
4. Use of a source of surface water.
5. Hauling of water by truck.¹⁸⁶

Finally, the MOE is not "responsible for the resolution of bacterial or nitrate contamination problems caused by a number of mutually interfering wells and septic systems in sub-divisions."¹⁸⁷

iv. MOE's Guidelines for Snow Removal — Snow Removal and Road Salt

At some MOE regional offices up to fifty percent of all complaints relating to groundwater contamination are related to road salt, mainly in wells which are less than thirty meters from the road.¹⁸⁸ Also, the selection of a land site for snow disposal and the use of any road salt additives have important groundwater consequences.

The road salting and related activities in Ontario are not regulated under the EPA but rather are subject to provincial guidelines entitled *Guidelines for Snow Disposal and Deicing Operations in Ontario*, last updated in 1975.¹⁸⁹ They propose that approved land sites be used to avoid direct disposal of snow into lakes and rivers, and also, they set out land site criteria for snow disposal.¹⁹⁰ One criterion is that groundwater uses immediately down-gradient from a possible site be considered and hydrogeologic investigations be conducted.¹⁹¹ The guidelines also suggest that certain rock salt additives that are environmentally hazardous,

185. ONTARIO MINISTRY OF THE ENV'T, *THE RESOLUTION OF GROUND WATER QUALITY INTERFERENCE PROBLEMS* 9 (1986).

186. *Id.* at 10.

187. *Id.* at 11.

188. C. Pupp & G. Grove, *supra* note 2, at 21.

189. ONTARIO MINISTRY OF THE ENV'T, *GUIDELINES FOR SNOW DISPOSAL AND DEICING OPERATIONS IN ONTARIO* (1975).

190. *Id.* at 5-6.

191. *Id.* at 6.

such as hexavalent chromium, should not be used.¹⁹² Finally, the guidelines recommend that road salt stockpiles should always be protected from precipitation or surface run-off and underlain with an impervious apron (preferably asphalt) and dyked to prevent the seepage of salt leachate.¹⁹³

v. Guidelines — Mining Effluents

The Effluent Guidelines and Receiving Water Quality Objectives for the Ministry of the Environment¹⁹⁴ state minimum requirements for the effluent discharged by mines in Ontario. The guidelines also provide levels for metals, suspended solids, oxygen demand, pH, sulphates and total dissolved solids for mine-mill effluent streams. The guidelines also provide that each new mining operation in Ontario will receive an individual set of these regulations that reflect the environmental and other mining development factors for a given area.

vi. Guidelines for the Treatment and Disposal of Liquid Industrial Wastes in Ontario

These guidelines state that only waste treatment and disposal processes and sites which have received a Certificate of Approval from the MOE may be used for the treatment and disposal of hauled liquid industrial wastes.¹⁹⁵ The guideline goes on to set out the recommended treatment and disposal processes for various categories of hauled liquid industrial wastes. The second part of the guideline classifies types of liquid wastes in Ontario.

2. Evaluation

As should be clear from the description of the provincial regulation, the general prohibitions will provide a deterrent against flagrant breaches of environmental regulations, provided that they are adequately enforced and that fines are sufficiently large. What percentage of total infractions are detected, and then, prosecuted, is not known. What is known is that while fines for pollution offenses have risen in the last four years, they are still insufficient to provide a general deterrent to polluters. All of this

192. *Id.* at 7.

193. *Id.* at 8.

194. ONTARIO MINISTRY OF THE ENV'T, EFFLUENT GUIDELINES AND RECEIVING WATER OBJECTIVES FOR THE MINING INDUSTRY OF ONTARIO (1986).

195. ONTARIO MINISTRY OF THE ENV'T, GUIDELINES FOR THE TREATMENT AND DISPOSAL OF LIQUID INDUSTRIAL WASTES IN ONTARIO (1978).

activity, however, is remedial rather than preventative and, therefore, cannot provide the primary basis for state control.

The specific legislation, although not designed with groundwater as its primary concern, nevertheless does deal with groundwater contamination as part of its overall activity. Normally, statutes tend to be rather general and regulations precise and detailed. Here, however, even the regulations are fairly general, leaving a broad scope for individual discretion. Although some commentators welcome this as desirable flexibility,¹⁹⁶ others who are less optimistic about the political/governmental process would see this discretion as leaving public servants vulnerable to a great deal of political and legal pressure from both public and private sector proponents of major projects.

Finally, we come to the guidelines and policies. These indicate, in general terms, how the Ministry of the Environment intends to approach its mandate in areas not covered by specific regulations. Much of what is found in the Blue Book and other guidelines should be defined with greater precision and turned into regulations. That is the only way they will acquire the force of law. As Freeze and Cherry have said:

In our opinion, much has gone wrong with the efforts resulting from the well-intentioned legislative program south of our border. One cannot say this for Canada, because in Canada there has been little legislative effort, and therefore little to criticize except that lack of effort.¹⁹⁷

The "reasonable use" guideline has already been criticized and should be abandoned in favor of a more ecologically sound approach.

In 1651 Thomas Hobbes told us, in *Leviathan*, that "covenants, without the sword, are but words."¹⁹⁸ The modern version of this wisdom, applied to environmental law, is that laws without enforcement are just words. Attempts to obtain information about enforcement of legislation, regulations and guidelines dealing with groundwater from the Ministry were unsuccessful because the Ministry's computerized data base does not keep track of the type of contaminant or the type of water involved in various types of charges.¹⁹⁹

IV. CONCLUSIONS

1. Although the protection of underground sources of drinking water may become an important environmental issue in the next decade,

196. Freeze & Cherry, *supra* note 81, at 461.

197. *Id.* at 458.

198. T. HOBBS, *LEVIATHAN* 223 (C.B. MacPherson ed. 1968).

199. Communication with Investigations and Enforcement Branch, Ministry of the Environment (1990).

groundwater contamination in Canada has been slow to emerge as a major public issue because it is an unseen resource:²⁰⁰ out of sight, out of mind.

2. Responsibility for regulating groundwater problems is dispersed among various government ministries and governed indirectly rather than directly by various statutes, regulations and even guidelines. Despite the recognition for many years by scientists that groundwater contamination is a problem, we have no national policy. Indeed, it would be fair to say that Canada's policy is to have no policy. The strategy is not to solve the environmental problem but merely to appear to be interested in trying to do so. That may be because real solutions may already be perceived as prohibitively costly and, as well, as creating few economic winners and many losers. The situation has caused Professor Cherry to remark that: "Planning and regulation by governments in Canada at present contribute little towards aquifer protection or prevention of use of contaminated well water."²⁰¹

3. The extent of groundwater contamination in Ontario is not known. Because contaminant plumes and other forms of contamination move rather slowly, there may already be sufficient latent contamination moving towards the various aquifers to contaminate them. Once contamination has taken place, hydrogeologists are virtually all in agreement that much of the contaminated water moving into fresh-water aquifers is essentially irreversible, resulting in a continual shrinkage of the volume of fresh-water available because clean-up efforts are seldom entirely successful.

4. Ontario has relied primarily on programs to regulate point sources of contamination. "The greatest threat to groundwater quality may well come from nonpoint sources associated with agricultural fertilizers, herbicides and pesticides, and from unmanaged point sources such as machine manufacturing and repair shops, dry-cleaning shops . . . [and] other industrial concerns, . . . septic systems or leaks in sewer lines."²⁰²

5. "Ontario has no legislation which provides for the designation and protection of sole-source aquifers or requires the development of well-head protection programs. . . . [Nor are there any] provincial policy statements or zoning orders . . . for the protection of susceptible aquifers, which municipalities would be required to have regard to when drafting land use planning documents. Finally, Ontario has no programme in place to monitor the long-term quality of groundwater across the Prov-

200. D. Neufeld, *supra* note 131, at 1.

201. Cherry, *supra* note 117, at 57.

202. Freeze & Cherry, *supra* note 81, at 460.

ince in a systematic way.”²⁰³

6. Polluting groundwater rather than surface water appears to many people to be a “solution.” It used to be possible to talk about disposing of wastes by “throwing them away.” Now we know there is no such place as “away.” There are, however, extensive lags between the act of discharging contaminants into the soil and their detection (if ever). Hence for our society, polluting groundwater rather than surface water buys time — perhaps ten to fifty years. But buying this time is like borrowing money: it is only obtained at a cost. This raises two policy issues. First, if we cannot afford to prevent that contamination now, how can we afford it later when clean-up is much more costly (if indeed, it is even possible)? In other words, as groundwater increasingly becomes contaminated, we are buying less and less time at higher and higher cost. Second, just as the last generation has given us today’s problems, the present generation is compounding it, giving rise to the question of intergenerational equity. If we are going to avoid burdening future generations, policy approaches would call for a vigorous regime of cost internalization to ensure that, for example, when a mine is abandoned there will be sufficient funds to implement a sound abandonment plan.

7. In some cases, the cost of clean-up of spills and other soil contamination will probably exceed the value of the land. This is already resulting in cases in which landlords or lenders are responsible for cleaning up land which they had no part in contaminating. This is creating a whole new industry of environmental audits.

8. The U.S. regulatory regimes, although somewhat imperfect, are far ahead of the situation in Canada. Ontario, one of Canada’s most advanced provinces from the standpoint of environmental protection, has a long way to go to catch up to the standard of regulation of groundwater enjoyed in the U.S. Despite particular progressive bits of legislation here and there, most other provinces in Canada are not even up to the Ontario standards. We have a long way to go.

203. D. Neufeld, *supra* note 131, at 22.